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CLAIMS

1. System (1) for improving the fixation of proximal fractures of the humerus, including at least a humeral nail (10) to be inserted in a humeral shaft (9) and comprising at least proximal transversal holes (5, 6, 7) for the passage of corresponding locking screws (3), at least a screw of said locking screws (3) having a screw head (4) and a screw body (31); the system further including at least an intermediate plate element (15) inserted between said screw head (4) and the bone cortex surface (14) so that the head (4) is abutting against said plate (15);
5 characterised in that said intermediate plate element (15) is slightly bent to adhere substantially to the bone cortex surface (14) and comprises a couple of elongated arm portions (18, 19) that are inserted in an astride position on the screw body before the final fastening of the screw head (4).
- 10 2. System according to claim 1, wherein said intermediate plate element (15) includes a slightly curved surface (16) to adhere substantially to the bone cortex surface (14).
- 15 3. System according to claim 1, wherein said enlarged arm portions (18, 19) present rounded ends.
- 20 4. System according to claim 1, wherein said intermediate plate element (15) comprises an enlarged portion (21) having at least a seat (22) for embracing at least a fragment fixation pin (23).
- 25 5. System according to claim 4, wherein said seat (22) is at least a hole (22) formed in said enlarged portion (20) of the intermediate plate element (15).
- 30 6. System according to claim 4, wherein said seat (22) is at least a hole (24) formed in at least one of said elongated arm portions (18, 19).
7. System according to claim 1, wherein said intermediate plate element (15) has a substantially rounded profile.
- 35 8. System according to claim 1, wherein said intermediate plate element (15) is an open washer integrally formed with a flange portion (21).
9. System according to claim 1, wherein a second intermediate plate element (15') is inserted between the screw head (4) of a second locking screw (3) and the bone cortex surface (14).

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10. System according to claim 9, wherein said second intermediate plate element (15') is larger than a first intermediate plate element (15).
11. System according to claim 9, wherein said second intermediate plate element (15) comprises a couple of elongated arm portions (18, 19) that are inserted in an astride position on the screw body.
12. System according to claim 9, wherein said first intermediate plate element (15) comprises a couple of elongated arm portions (18, 19) that are inserted in an astride position on the screw body before the final fastening of the screw head (4) and said second intermediate plate element (15') comprises a couple of elongated arm portions that are longer than the arm portions of said first intermediate plate element (15).
13. System according to claim 1, wherein at least one (27) of said transversal holes has an internal partially threaded portion (28) and the corresponding screw (3) has an outside thread diameter smaller than the diameter of said at least one transversal hole (27) that receives such a screw.
14. System according to claim 13, wherein said at least one (27) of said transversal holes comprises a couple of opposite holes (27', 27'') on opposite wall of a cannulated nail (30) and the hole (27') closer to the screw head (4) includes said partially threaded portion (28).
15. Fastening device (2) for improving the fixation of proximal fractures of the humerus, of the type structured to work with at least a humeral nail (10) to be inserted in a humeral shaft (9) and comprising at least proximal transversal holes (5, 6, 7) for the passage of corresponding locking screws (3), at least one screw of said locking screws (3) having a screw head (4) and a screw body; said device comprising an intermediate plate element (15) to be inserted between said screw head (4) and the bone cortex surface (14) for enlarging the abutting area of the screw head; characterised in that said intermediate plate element (15) is slightly bent to adhere substantially to the bone cortex surface (14) and comprises a couple of elongated arm portions (18, 19) that are inserted in an astride position on the screw body before the final fastening of the screw head (4).
- 35 16. Fastening device according to claim 15, wherein said intermediate

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plate element (15) includes a slightly curved surface (16) to adhere substantially to the bone cortex surface (14).

17. Fastening device according to claim 15, wherein said enlarged arm portions (18, 19) present rounded ends.

5 18. Fastening device according to claim 15, wherein said intermediate plate element (15) comprises an enlarged portion (21) having at least a seat (22) embracing at least a fragment fixation pin (23).

10 19. Fastening device according to claim 18, wherein said seat (22) is at least a hole (22) formed in said enlarged portion (20) of the intermediate plate element (15).

20. Fastening device according to claim 18, wherein said seat (22) is at least a hole (24) formed in at least one of said elongated arm portions (18, 19).

15 21. Fastening device according to claim 15, wherein said intermediate plate element (15) has a rounded profile.

22. Fastening device according to claim 15, wherein said intermediate plate element (15) is an open washer integrally formed with a flange portion (21).

20 23. Method for reducing proximal fractures of the humerus by using a humeral nail (10) to be inserted in a humeral shaft (9) and comprising at least proximal transversal holes (5, 6, 7) for the passage of corresponding locking screws (3), at least a screw of said locking screws (3) having a screw head (4) and a screw body (31); the method including a surgery phase producing an incision in the muscle surrounding the bone to access to the fractured, and wherein at least an intermediate plate element (15) is inserted between said screw head (4) and the bone cortex surface (14) before the final fastening of the screw (3) so that the head (4) is abutting against said plate (15).

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